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**THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Applicant: Tetsuya KAMIHARA

Title: FUEL CELL SYSTEM

Appl. No.: 10/553,945

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Examiner: Eugenia Wang

Art Unit: 1795

Confirmation 5799

Number:

BRIEF ON APPEAL

Mail Stop Appeal Brief - Patents

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Sir:

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1. REAL PARTY IN INTEREST

The real party in interest is the assignee of record, Nissan Motor Co., Ltd.

2. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

3. STATUS OF CLAIMS

Claims 1 and 3-17 are pending in the application. Claim 2 is cancelled. Claims 1 and 3-17 are rejected and are the subject of this appeal.

4. STATUS OF AMENDMENTS

The present application is under a final rejection (See Final Rejection mailed October 19, 2009). Appeal of claims 1 and 3-17 is appropriate because all of the claims have been twice rejected. See 35 U.S.C. § 134(a). There are no amendments after final rejection.

5. SUMMARY OF CLAIMED SUBJECT MATTER

The invention of claim 1 is directed to a fuel cell system, comprising: a fuel cell stack **(fuel cell stack 1 in FIG. 1)** configured to provide electric power or electric current; a cooling unit **(coolant passage 2, coolant pump 3, and radiator 4, collectively, in FIG. 1)** configured to cool the fuel cell stack by flowing a coolant through a coolant passage **(coolant passage 2 in FIG. 1)** provided in the fuel cell stack; an inlet temperature detecting unit **(inlet temperature sensor 5 in FIG. 1)** configured to detect the temperature of the coolant at an inlet of the fuel cell stack **(specification, page 4, lines 29-30)**; and a control unit **(controller 21 in FIG. 1)** configured to control the electric power or electric current extracted from the fuel cell stack in accordance with the coolant temperature detected by the inlet temperature detecting unit **(specification, page 5, lines 1-5)** and configured to set a limit value of the electric power or electric current extracted from the fuel cell stack in such a manner that the higher said coolant temperature becomes, the lower said limit value is set **(See maximum current vs. inlet temperature map of FIG. 4, steps S1 and S2 of FIG. 5, and specification, page 7, lines 11-16, 20-24)**.

6. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

The sole ground of rejection to be reviewed on appeal is:

The rejection of claims 1 and 3-17 under 35 U.S.C. § 103(a) as being unpatentable over U.S. 2003/0003335 to Kazama et al. ("Kazama") in view of U.S. 2004/0001985 to Alva ("Alva").

7. ARGUMENT

Claims 1 and 3-17

The rejection of claims 1 and 3-17 under 35 U.S.C. § 103(a) as being unpatentable over U.S. 2003/0003335 to Kazama et al. (“Kazama”) in view of U.S. 2004/0001985 to Alva (“Alva”).

As an initial matter, Appellant notes that the references applied in the rejection of the claims fail to disclose the control unit of claim 1, because the references fail to disclose the structure of the control unit. The control unit in claim 1 is “configured to” perform certain functions. Such configuration of the control unit is more than mere intended use, as suggested by the Examiner on page 5 of the Final Rejection, but requires structure in the control unit to perform such functions as discussed below. In other words, the control unit must be programmed or otherwise configured to perform the recited functions.

The Federal Circuit has held that a general purpose computer programmed to carry out a claimed invention creates a new machine because the general purpose computer becomes a special purpose computer once it is programmed to perform particular functions. (*See WMS Gaming Inc. v. International Game Technology*, 184 F.3d 1139, 1348, 51 USPQ2d 1385 (Fed. Cir. 1999) (“A general purpose computer, or microprocessor, programmed to carry out an algorithm creates ‘a new machine, because a general purpose computer in effect becomes a special purpose computer once is programmed to perform particular functions pursuant to instructions from program software’ citing *In re Alappat*, 33 F.3d 1526, 1545, 31 USPQ2d 1545, 1558 (Fed. Cir. 1994)) (“[I]f a machine is programmed in a certain new and unobvious way, it is physically different from the machine without the program; its memory elements are differently arranged.” citing *In re Bernhart*, 57 C.C.P.A. 737, 417 F.2d 1395, 1399-1400, 163 USPQ 611, 615-16 (CCPA 1969))(emphasis added))).

Appellant respectfully submits that these cases demonstrate that a device, such as a control unit or computer, that is programmed or otherwise configured to perform a function as a special purpose computer or machine is not only different from a general purpose computer or machine, but that the configuration or programming of a special purpose computer or

machine to perform a function provides structure that is not present in a general purpose computer or machine that lacks the same configuration or programming of the special purpose computer or machine. Therefore, such a general purpose computer or machine does not anticipate such a special purpose computer or machine because the general purpose computer or machine does not contain all of the structural features of the special purpose computer or machine.

Furthermore, the court of *In re Prater*, which was also cited by the Federal Circuit in *In re Alappat*, considered arguments that a general purpose computer could be programmed to practice a claimed device, such as a special purpose computer. *See* 415 F.2d 1393, 1405 (C.C.P.A. 1969). The court suggested that such an analysis may be rooted in hindsight because it assumes the existence in the prior art of an applicant's discovery, not just the existence of a general purpose computer in the prior art and the ability to program it. Instead, the court noted that a proper obviousness determination under 35 U.S.C. § 103 requires an analysis of the prior art at the time that the invention was made. *Id.* at 1406. The court further stated that even if general purpose computers and typical programming techniques existed at the time of an invention, an applicant's invention is still not obvious under 35 U.S.C. § 103 if one of ordinary skill in the art did not have the knowledge of applicant's discovery because one of ordinary skill in the art would not have known what to program such a general purpose computer to do. *Id.*

Appellant respectfully submits that *In re Prater* demonstrates that it would not have been obvious to modify a prior art general purpose machine or computer to perform the function of a claimed special purpose machine, computer or control unit without a teaching or suggestion in the prior art of Appellant's invention that supports such a modification of a known general purpose machine, computer or control unit.

In view of this controlling legal authority, Appellant respectfully submits that a special purpose machine, computer or control unit that is programmed or otherwise configured to perform a function is not anticipated by a general purpose machine or computer that lacks the same configuration or programming, and that it would not have been obvious to modify such a general purpose machine or computer to have the configuration or programming of a

claimed special purpose machine, computer or control unit, absent a teaching or suggestion in the prior art to do so.

In the present case, the references applied in the rejection of the claims do not disclose a controller configured or programmed to perform all the functions performed by the control unit of claim 1. Moreover, the Examiner has provided no evidence that the functions that the control unit of claim 1 is configured to perform would have been obvious in view of the applied references. Thus, the references applied fail to disclose the structure of the control unit as recited, and such a structure would not have been obvious in view of the applied references.

The Examiner states on pages 11-12 of the Final Rejection:

It is first submitted that “programmed to” and “configured to” are not synonymous, as being configured can relate to the structure of the computer/controller as it is connected to its peripheral extensions. Thus, the language “configured to” is broader than Applicant’s applied interpretation. Accordingly, the combination as set forth in the rejection above is seen to be “configured” in the same manner (as combination renders obvious the use of a controller connected to the necessary peripheral extensions). There is nothing in the claim language to preclude such an interpretation, and thus the actions performed are interpreted to be functional.

Appellant notes that claim 1 requires that the control unit itself be configured to perform recited functions, and thus the control unit itself must have structure to perform such functions. This interpretation of claim 1 is supported both by the case law and the dictionary definition of “configure.”

The Federal Circuit in *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998) indicates that the phrase “configured to” requires structure. In *State Street*, the Federal Circuit interpreted a claim under § 112, paragraph 6, as follows:

When independent claim 1 is properly construed in accordance with § 112, 6, it is directed to a machine, as demonstrated below, where representative claim 1 is set forth the subject matter in brackets stating the structure the written description discloses as corresponding to the respective “means” recited in the claims.

1. A data processing system . . . comprising: . . .

(c) first means [an arithmetic logic circuit **configured to** prepare the data disk to magnetically store selected data] for initializing the storage medium;

(d) second means [an arithmetic logic circuit **configured to** retrieve information from a specific file, calculate incremental increases or decreases based on specific input, allocate the results on a percentage basis, and store the output in a separate file] for decreasing . . . (**emphasis added**).

Thus, the Federal Circuit in *State Street*, in interpreting claim limitations, indicated that “configured to” requires structure.

The Board of Patent Appeals and Interferences in *Ex parte Schneider* 2009 WL 191989 (Bd. Pat. App. & Inter. 2009) has also found that the functional limitations of a controller “configured to” perform functions must be considered when interpreting an apparatus claim. In *Ex parte Schneider*, claim 1 at issue recited in part “a controller configured to” perform certain functions. In interpreting the claim language of a controller “configured to” perform certain functions, the Board noted that claimants may define claim elements using functional or structural language. *Id.* at *5 (citing *In re Swinehart*, 439 F.2d 210, 213 (CCPA 1971)).

Moreover, even under the Examiner’s broad interpretation of “configured to,” the references applied in the rejection of the claims do not disclose a controller configured or programmed to perform all the functions performed by the control unit of claim 1. That is, even if “configured” relates to the structure of the controller as it is connected to its peripheral extensions, the controller still must have the structure of actually being connected to any such extensions to allow it to perform the recited functions. The references applied in the rejection do not disclose a controller with such structure, whether the structure is entirely within the controller itself, or based on actual connections of the controller.

Still further, functional limitations in an apparatus claim can impart structural features in the claim. For example MPEP 2173.05(g) states in part:

In *Innova/Pure Water Inc. v. Safari Water Filtration Sys. Inc.*, 381 F.3d 1111, 1117-20, 72 USPQ2d 1001, 1006-08 (Fed. Cir. 2004), the court noted that the claim term “operatively connected” is “a general

descriptive claim term frequently used in patent drafting to reflect a functional relationship between claimed components," that is, the term "means the claimed components must be connected in a way to perform a designated function." "In the absence of modifiers, general descriptive terms are typically construed as having their full meaning." *Id.* at 1118, 72 USPQ2d at 1006. In the patent claim at issue, "subject to any clear and unmistakable disavowal of claim scope, the term 'operatively connected' takes the full breath of its ordinary meaning, i.e., 'said tube [is] operatively connected to said cap' when the tube and cap are arranged in a manner capable of performing the function of filtering." *Id.* at 1120, 72 USPQ2d at 1008., and

In a claim that was directed to a kit of component parts capable of being assembled, the Court held that limitations such as "members adapted to be positioned" and "portions . . . being resiliently dilatable whereby said housing may be slidably positioned" serve to precisely define present structural attributes of interrelated component parts of the claimed assembly. *In re Venezia*, 530 F.2d 956, 189 USPQ 149 (CCPA 1976). **(emphasis added)**

In the present case, the control unit of claim 1 must have structural features to perform its recited function.

Kazama and Alva fail to disclose or suggest at least the feature of independent claim 1 where the control unit is configured to "control the electric power or electric current extracted from the fuel cell stack in accordance with the coolant temperature detected by the inlet temperature detecting unit" and "to set a limit value of the electric power or electric current extracted from the fuel cell stack in such a manner that the higher said coolant temperature becomes, the lower said limit value is set."

Kazama discloses detecting the coolant temperature of a fuel stack (paragraph 0088). The maximum possible power generation of the fuel cell stack is then computed based on the detected fuel coolant temperature (paragraph 0089), where the maximum possible power generation amount is obtained based on the relation between the coolant temperature (fuel cell temperature) from the fuel cell stack and the maximum possible power generation amount shown in FIG. 13. Kazama further discloses that when an outputable power is larger than a margin load power, a control unit controls the power generation amount of a fuel stack such that the charged power becomes equal to an electric power difference between the margin load power and an outputtable power (abstract).

Kazama, however, does not disclose a control unit configured to either “control the electric power or electric current extracted from the fuel cell stack in accordance with the coolant temperature detected by the inlet temperature detecting unit” or “to set a limit value of the electric power or electric current extracted from the fuel cell stack in such a manner that the higher said coolant temperature becomes, the lower said limit value is set.” The Examiner on page 3 of the Final Rejection recognizes that Kazama does not disclose the temperature sensor on the inlet side, but cites Alva for curing the deficiencies of Kazama.

Appellant submits that Alva fails to cure the deficiencies of Kazama. Alva discloses a fuel cell cooling system, and that various measured parameters such as pressure, flow rate, and temperature at the inlet and outlet of the cell may be measured and the parameters used for controlling the operations of the components of the cell (paragraph 34). Even if Kazama were modified to include an inlet coolant temperature sensor, however, Alva makes no suggestion that the Kazama control should be modified “to set a limit value of the electric power or electric current extracted from the fuel cell stack in such a manner that the higher said coolant temperature becomes, the lower said limit value is set” as recited in claim 1. Thus, even if Kazama and Alva were combined, the combination would not have all of the features of independent claim 1.

The dependent claims are patentable for at least the same reasons as independent claim 1, from which they depend either directly or indirectly, as well as for further patentable features recited therein.

For the foregoing reasons, it is submitted that the PTO's rejections are erroneous, and reversal of the applied rejections is respectfully requested.

Respectfully submitted,

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8. CLAIMS APPENDIX

1. (Previously Presented) A fuel cell system, comprising:
a fuel cell stack configured to provide electric power or electric current;
a cooling unit configured to cool the fuel cell stack by flowing a coolant through a coolant passage provided in the fuel cell stack;
an inlet temperature detecting unit configured to detect the temperature of the coolant at an inlet of the fuel cell stack; and
a control unit configured to control the electric power or electric current extracted from the fuel cell stack in accordance with the coolant temperature detected by the inlet temperature detecting unit and configured to set a limit value of the electric power or electric current extracted from the fuel cell stack in such a manner that the higher said coolant temperature becomes, the lower said limit value is set.

2. (Cancelled).

3. (Previously Presented) The fuel cell system of claim 1, wherein
the control unit is configured to set said limit value to a fixed value until the coolant temperature reaches a prescribed temperature and lowers the limit value when the coolant temperature exceeds the prescribed temperature.

4. (Previously Presented) The fuel cell system of claim 3, wherein

when said coolant temperature exceeds the prescribed temperature, the control unit is configured to set said limit value in such a manner that the extracted current becomes lower as said coolant temperature becomes higher.

5. (Previously Presented) The fuel cell system of claim 1, wherein the control unit is configured to perform the following processes:

receive the coolant temperature detected by the inlet temperature detecting unit;

obtain a maximum electric current allowed to be extracted from the fuel cell stack based on said coolant temperature;

compare a requested electric current to the maximum electric current allowed to be extracted; and

select the smaller of the compared electric currents.

6. (Previously Presented) The fuel cell system of claim 1, wherein the control unit is configured to perform the following processes:

receive the coolant temperature detected by the inlet temperature detecting unit;

calculate an allowable value for the coolant temperature difference between the inlet and outlet of the fuel cell stack based on said coolant temperature;

estimate the coolant temperature difference between the inlet and outlet of the fuel cell stack based on the allowable value for the coolant temperature difference between the inlet and outlet of the fuel cell stack;

obtain a maximum electric current allowed to be extracted from the fuel cell stack based on the coolant temperature difference between the inlet and outlet of the fuel cell stack;

compare a requested electric current to the maximum electric current allowed to be extracted; and

select the smaller of the compared electric currents.

7. (Previously Presented) The fuel cell system of claim 1, further comprising:
an outlet temperature estimating unit configured to estimate the temperature of the coolant at an outlet of the fuel cell stack; wherein

the control unit controls the electric power or electric current extracted from the fuel cell stack in accordance with the temperature of the coolant at the outlet of the fuel cell stack estimated by the outlet temperature estimating unit.

8. (Previously Presented) The fuel cell system of claim 7, further comprising:
a coolant flow rate detecting unit configured to detect the flow rate of the coolant either directly or indirectly; and

a heat removal rate estimating unit configured to estimate the rate at which heat is transferred from the fuel cell stack to the coolant.

9. (Previously Presented) The fuel cell system of claim 8, wherein
the outlet temperature estimating unit is configured to estimate the coolant temperature at the outlet of the fuel cell stack based on the coolant flow rate detected by the coolant flow rate detecting unit and the heat removal rate estimated by the heat removal rate estimating unit.

10. (Previously Presented) The fuel cell system of claim 9, wherein the heat removal rate estimating unit is configured to estimate the heat removal rate based on the electric power or electric current extracted from the fuel cell stack.

11. (Previously Presented) The fuel cell system of claim 9, wherein the heat removal rate estimating unit is configured to estimate the heat removal rate based on the electric power or electric current extracted from the fuel cell stack and the output voltage of the fuel cell stack.

12. (Previously Presented) The fuel cell system of claim 10, further comprising: a stack temperature detecting unit configured to detect the temperature of the fuel cell stack either directly or indirectly.

13. (Previously Presented) The fuel cell system of claim 12, wherein the heat removal rate estimating unit is configured to estimate the heat removal rate based on the electric power or electric current extracted from the fuel cell stack and the temperature of the fuel cell stack detected by the stack temperature detecting unit.

14. (Previously Presented) The fuel cell system of claim 7, further comprising: a coolant flow rate setting unit configured to set the flow rate of the coolant in such a manner that, at least in a high load region of the fuel cell, the difference between the coolant temperature at the inlet of the fuel cell stack and the estimated coolant temperature at the outlet of the fuel cell stack increases as the output of the fuel cell stack increases.

15. (Previously Presented) The fuel cell system of claim 7, further comprising:
an outlet temperature detecting unit configured to detect the temperature of the coolant
at the outlet of the fuel cell stack.

16. (Previously Presented) The fuel cell system of claim 15, wherein
the control unit limits the electric power or electric current extracted from the fuel cell
stack when the temperature detected by the outlet temperature detecting unit exceeds a
prescribed value.

17. (Previously Presented) The fuel cell system of claim 16, wherein
when the coolant temperature is rising, the control unit is configured to set said
prescribed value in such a manner that the electric power or electric current extracted from
the fuel cell stack is limited based on the temperature of the coolant at the inlet of the fuel cell
stack before it is limited based on the temperature of the coolant at the outlet of the fuel cell
stack while the coolant temperature rises.

9. EVIDENCE APPENDIX

None.

10. RELATED PROCEEDINGS APPENDIX

None.